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TRENDS OF DOUGLAS-FIR TUSSOCK MOTH INFESTATIONS IN NORTHERN IDAHO AND COLBERT, WASHINGTON

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HISTORY

The following paragraphs briefly summarize historical tussock moth infestations in the western American Continent to dramatize their cyclic behavior and reoccurrence in certain areas.

The first recorded infestation of the Douglas-fir tussock moth, Hemerocampa pseudotsugata McD. was near Chase, B. C., Canada in 1918. The first record of it in the United States was in 1927. A severe epidemic occurred in alpine fir stands on the Humboldt National Forest in Nevada. An infestation that started in 1928 on the Idaho and Weiser National Forests, Idaho destroyed 40 square miles of Douglas-fir timber by 1929. About 300,000,000 board feet of commercial timber were killed on the Colville National Forest, Washington in 1930. Spot infestations occurred within the Wood River drainage, Sawtooth National Forest, Idaho, in 1935 and lasted four years.1/

Tussock moth populations remained endemic in the northwest until 1944 when defoliation of ornamental and shelter-belt trees was detected at Rathdrum, Troy, Moscow Mountain, and Sandpoint, Idaho and Palouse, Washington. Then in 1945 severe infestations were discovered over 320 acres near Viola, Idaho and in 80 acres between Fairfield and Latah, Washington.1/ This epidemic covered about 500,000 acres of Douglas-fir and true fir forests in northern Idaho, northeastern Oregon, and eastern Washington by 1947. Aerial sprays of DDT were used to control the epidemic in the spring of 1947.

Of interest, is that two large areas of infestation received no control treatment in 1947. One area (20,000 acres of grand fir) was between the towns of Orofino, Headquarters and Weippe, Idaho. The other area was located near

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1/ Evenden, J. C., 1946. An outbreak of the Douglas-fir tussock moth (Hemerocampa pseudotsugata) in Latah and Clearwater Counties, Idaho. Unpublished report filed at Div. For. Insect Res., Intermountain Forest and Range Exp. Sta., For. Service, USDA, Missoula, Montana.

Colville, Washington and consisted of about a dozen infestation centers, totaling about 10,000 acres of Douglas-fir. Essentially, 1947 tussock moth broods were brought under control by natural enemies in both areas. A disease caused by a polyhedral virus killed many of the larvae, and parasites caused the death of most of the pupae.2/

Another serious outbreak developed during 1955 in northeastern Washington. About 9,000 acres were infested in Stevens County, 10 acres in Spokane County, and 2 acres in Pend Oreille County. This epidemic subsided from natural causes by 1956. An epidemic that spread over 10,000 acres in 1951, then became endemic in 1952, became destructive over 26,000 acres during 1957 in Owyhee County, Idaho.

The cycle began again in 1961. Douglas-fir, grand fir and ornamental spruce trees near farms and private homes were heavily defoliated in Moscow, Clarks Fork and Bonners Ferry, Idaho.

INTRODUCTION

Aerial surveys of northern Idaho and northeastern Washington during 1962 indicated that eight more centers, other than the three mentioned above, contained tussock moth infestations. These centers were in or near Copeland, Moyie, Albeni Falls, Hayden Lake, Coeur d'Alene, St. Maries, and Orofino, Idaho and Colbert, Washington.

In 1962 defoliated trees were more abundant in Clarks Fork; defoliation increased, and the infestation spread around Bonners Ferry. Most of the attacked trees in Moscow were sprayed in 1961 and no egg masses could be detected during 1962. Damage to forest stands surrounding the infested towns was not detected in 1962 from the air or on the ground. But, the Palouse Ranger District, St. Joe National Forest, reported that a few larvae could be found in some of their forested areas. Tiny larvae were probably borne from infested trees in Moscow by prevailing westerly winds in 1961. They completed their life-cycle, and the larvae found on the Palouse District in 1962 are their progeny.

Over 55 private residences in the 10 infested areas contained from 1 to 15 attacked trees. Near Colbert, Washington one infested stand of pole-size Douglas-fir contains over 200 trees. Observations disclosed that single Douglas-fir or grand fir trees were usually in the middle of fields; defoliation occurred most often on rows of trees planted around the perimeters of people's yards.

2/ Evenden, J. C., and E. J. Jost, 1947. Tussock moth control, north Idaho. Unpublished report filed at Div. For. Insect Res., Intermountain For. and Range Exp. Sta., For. Service, USDA, Missoula, Montana.

Biological evaluations of the tussock moth infestations were made during October 1962 to determine their trend in 1963.

METHODS

Adult tussock moths emerge from their cocoons about the middle of August. A wingless female moth, after being fertilized by a male, lays eggs on the top surface of a cocoon in a frothy mass mixed with her body hairs. Eggs hatch in early spring (see photograph).

The number of current egg masses on cocoons compared with the number from previous years has been used as a guide for predicting the trend of Douglas-fir tussock moth infestations. As an epidemic increases, new egg masses greatly outnumber old ones. Cocoon samples were obtained by hand-picking from the lower limbs of host trees or by pole pruners from the upper limbs.

These cocoon samples were brought back to the laboratory and examined for egg masses, adult emergence, and opened to determine pupal mortality.

RESULTS

Trends for the infestations in Idaho and Washington, based on data from Table 1 that pertains to percentages of current egg masses and mortality, are listed below:

Locality of infestation	Percentage of total egg masses that were current	Percentage of pupae killed	Probable infestation trend for 1963
Bonners Ferry	80	28	Increase
N. Bonners Ferry	78	25	Increase
Copeland	85	18	Increase
Moyie	72	38	Slight Increase
Clarks Fork	54	11	Static
Albeni Falls	90	26	Increase
Hayden Lake	61	14	Slight Increase
Coeur d'Alene	61	19	Slight Increase
Colbert, Washington	96	9	Increase

West of St. Maries, Idaho and in Orofino, Idaho several trees were lightly infested. Adequate samples could not be collected. The population will probably increase on these trees.

Several private individuals had infested trees sprayed with DDT during 1962 in Bonners Ferry, Moyie, Hayden Lake and Coeur d'Alene. Good control was obtained in almost all cases. The main difficulty was spraying infested tree tops with inadequate power sprayers.

Dipterous parasites were found inside pupae more often than Hymenopterous ones. This was observed in 1961 also. Parasitism does not seem to have increased since 1961 in any areas.

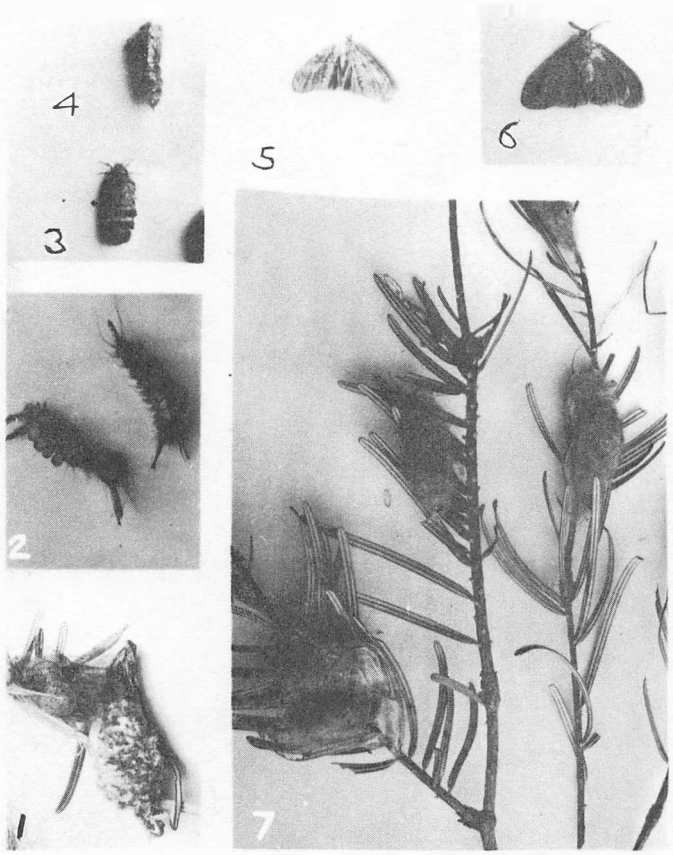
DISCUSSION

In general, the prediction is that defoliation of ornamental Douglas-fir, true fir and spruce trees by the Douglas-fir tussock moth will increase to some extent around farms and homes in infested areas. Many of these trees have suffered heavy defoliation - 80 percent of the needles on some. Occasional dead trees were found.

If natural enemies, or private spraying does not reduce the moth populations to endemic levels, some additional infestations may occur on forested areas in the next two years. The timber stands on the Palouse Ranger District will be kept under close surveillance for any increased defoliation.

Table 1.--Abundance of Douglas-fir tussock moth egg masses on cocoons collected from Northern Idaho, and Colbert, Washington, and percentages of pupal mortality during October 1962.

Cocoon collecting areas	Cocoons bearing egg masses		Pupae in cocoons				Total number of cocoons examined
	1962	Older	Successfully emerged	Killed by Diptera	Hymenoptera	Other agents	
Bonners Ferry, Idaho	256 80%	63 20%	398 72%	79 14%	12 2%	65 12%	554 -
N. Bonners Ferry, Idaho	162 78%	46 22%	272 75%	43 12%	7 2%	38 11%	360 -
Copeland, Idaho	178 85%	32 15%	229 82%	25 9%	6 2%	19 7%	279 -
Moyie, Idaho	217 72%	82 28%	508 62%	208 25%	21 3%	86 10%	823 -
Clarks Fork, Idaho	99 54%	84 46%	218 89%	12 5%	3 1%	13 5%	246 -
Albeni Falls, Idaho	64 90%	7 10%	94 74%	21 16%	1 1%	11 9%	127 -
Hayden Lake, Idaho	92 61%	59 39%	214 86%	9 4%	3 1%	22 9%	248 -
Coeur d'Alene, Idaho	155 61%	98 39%	217 81%	3 1%	7 3%	39 15%	266 -
East of Colbert, Washington	228 96%	9 4%	346 91%	7 2%	0 0	25 7%	378 -



Douglas-fir tussock moth

1. Egg mass
2. Caterpillars
3. Adult female
4. Pupal case
5. Adult male
6. Adult male
7. Cocoons

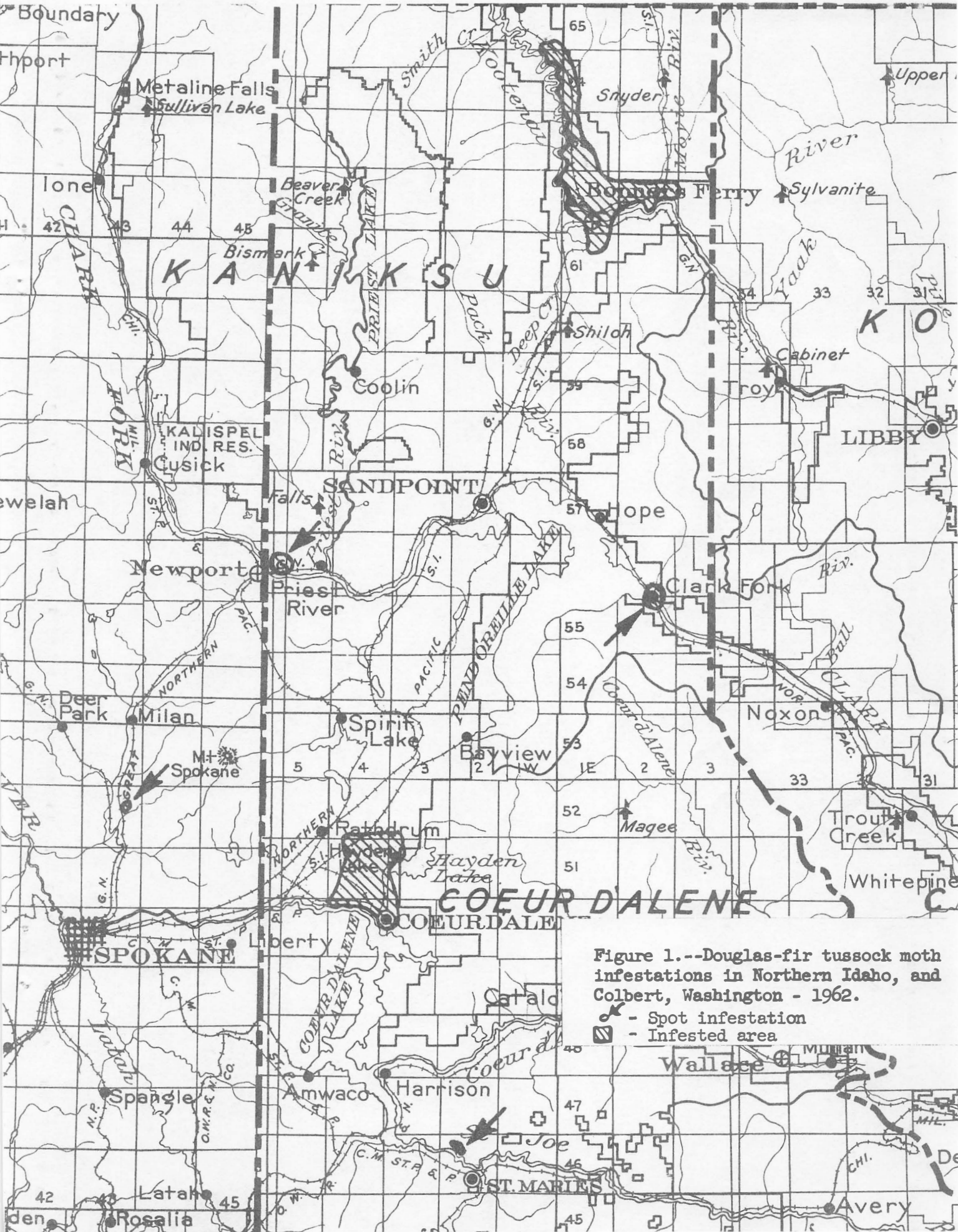


Figure 1.--Douglas-fir tussock moth infestations in Northern Idaho, and Colbert, Washington - 1962.

- Spot infestation
- Infested area